

PROPOSAL FOR A "SMOG TAX"

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### OBJECTIVES

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The "Smog Tax" proposed here is directed at the problem of curbing the production of smog by vehicles in the Los Angeles basin. A satisfactory solution to the problem in question should achieve the following objectives:

- 1) reduce the total emission of air pollutants from automobile exhausts in the Los Angeles basin to an acceptable level;
- 2) achieve the desired reduction as soon as possible;
- 3) minimize the required administrative expense;
- 4) minimize interference in individual affairs;
- 5) treat individuals in different circumstances as equitably as possible.

We know of no smog-control proposal currently under consideration which would meet all the criteria listed above. The typical proposals would, ~~as far as~~ achieve too little smog reduction, too late, with too much administrative expense, with grossly inequitable treatment of individuals in different circumstances, and with too much interference in individual affairs. The proposed Smog Tax, although by no means perfect, appears to be a much more promising approach to the reduction of smog emitted by automobile exhausts. In the following sections we will first describe the Smog Tax proposal and then compare it with alternative smog-control proposals.

## SMOG TAX PROPOSAL

### Principle of Smog Tax

The central idea is to tax each vehicle operator according to his vehicle's total output of air pollutants within the Los Angeles basin. An operator is not required by law to take any action to reduce pollutant emission. The Smog Tax, however, gives him an economic incentive to take such action in order to reduce his tax bill. The choice of what action to take, if any, is made by the individual. His decision will depend on such factors as the severity of the tax, the possibilities of tax evasion, the availability, cost and inconvenience of various methods of reducing smog emission, and, of course, individual circumstances and attitudes. Anti-smog action induced by the Smog Tax will no doubt vary widely among individuals. It may take a rather high Smog Tax to induce sufficient individual response, on the average, to bring total pollutant emission to an acceptable level. The illustrative Smog Tax schedule described below may conceivably be either too high or too low, depending on the degree of individual responsiveness to the tax, and on the desired overall smog reduction goal.

### General Features of Smog Tax

A direct tax on the total pollutant output of each individual would be prohibitively difficult and expensive to administer. An indirect tax-rebate plan appears to be a more feasible way to achieve approximately the same end.

A "Fresh Air District" is defined, which includes all of Los Angeles and Orange Counties, the more densely populated western areas of Riverside and San Bernardino Counties within the Los Angeles basin, and, for reasons to be mentioned later, possibly extending some distance into the relatively thinly populated surrounding areas.

A flat gross tax of (for example) 10 cents per gallon, over and above state and federal taxes, is levied on all gasoline sold in the District, with a provision for subsequent periodic rebates according to an official "smog rating" for the vehicle that uses the taxed gasoline. The rating is based on a standard test measuring the amount of air pollutants emitted per gallon of gasoline consumed by the vehicle under simulated average traffic conditions. Those in the worst rating category receive no rebate; a vehicle emitting no pollutants would qualify for a full rebate of (in this example) 10 cents per gallon; those with intermediate ratings qualify for corresponding intermediate rebates.

The total net tax (i.e. total gross tax less total rebate) paid by an individual is equal to the net tax per gallon (i.e. gross tax per gallon less rebate per gallon) times the number of gallons purchased in the period in question within the Fresh Air District. His total pollutant output within the District during the period is approximately equal to his rated pollutant output per gallon times the number of gallons consumed there. If the rebate schedule is set so that the net tax per gallon is approximately proportional to the individual's rated pollutant output per gallon, then the total net tax paid by each individual will be approximately proportional to his total output of pollutants within the District during the period.

#### Effects of Smog Tax

An individual can reduce his net smog tax bill by improving the smog rating of his car or by reducing his total gasoline consumption; or both.

Some of the actions he can take toward these ends are:

- 1) tuning up or overhauling the engine, typically improving both the smog rating and gasoline mileage;
- 2) buying a car with a better smog rating;

- 3) buying a car with better gasoline mileage;
- 4) driving fewer miles per year within the basin;
- 5) driving within the basin with a lighter foot on the throttle, thereby improving gasoline mileage;
- 6) for owners of more than one car, doing more of the driving within the basin in the car with the better smog rating;
- 7) for owners of more than one car, doing more of the driving within the basin in the car with the better gasoline mileage;
- 8) installing special camshafts, carburetors, and other devices designed to improve fuel combustion within the engine, thereby improving both the smog rating and gasoline mileage;
- 9) installing exhaust-cleanup devices, high or low temperature, catalytic or non-catalytic, thereby improving the smog rating.

The actions above imply that unburned hydrocarbons are the principal smog-producing component. If nitric oxides or other compounds are also important offenders, and are taken into account in the smog rating, other actions may be called for.

One important conclusion to be drawn from the actions listed above is that effective smog-control need not necessarily await the perfection of special anti-smog devices. Actions (1) through (7) can, in fact, be taken immediately, and the Smog Tax would provide an incentive for such immediate action. The installation of redesigned camshafts could also proceed immediately,<sup>1</sup> but other devices in category (8) may not yet be perfected. The various actions immediately available could probably go a long way toward achieving the desired smog-reduction goal.

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<sup>1</sup>Redesigned camshafts are used in some 1959 "economy" engines. This represents a welcome retreat from the recent horsepower race. In that race, camshafts were designed for maximum power at high speed, giving valve timing badly suited for city driving, resulting in the emission of much unburned fuel at city driving speeds.

The present price of gasoline, without the Smog Tax, already furnishes some incentive to reduce gasoline consumption via actions (1), (3), (4), (5), (7) and (8). The net Smog Tax (gross Smog Tax less rebate) is, in effect, an increase in the price of gasoline, and should add to this incentive. We should not, however, be too optimistic about such incentive effects. On the whole people have not taken advantage of such measures to the extent that some may think is justified by the present price of gasoline. If that is the case, we should not necessarily expect people to change their habits dramatically simply because the cost of gasoline is increased several cents per gallon by the Smog Tax.

On the other hand, attitudes apparently can and do change: American auto manufacturers, for example, seem to believe that people have recently started becoming economy-minded. Perhaps the Smog Tax, accompanied by a vigorous propaganda campaign to make people aware of the possibilities and advantages of various measures to reduce gasoline consumption, would have a "trigger effect" which would suddenly occasion the actions that drivers should have taken anyway. The Smog Tax would, of course, induce people to cut gasoline consumption to a greater extent than if they were affected by the propaganda alone.

Reducing gasoline consumption, naturally, is not the only way to reduce one's Smog Tax bill. An alternative involves the reduction of the net tax paid per gallon, by taking action to improve the smog rating of the vehicle one is using, in order to qualify for a larger rebate per gallon. Such actions include (1), (2), (6), (8), and (9). Of these, as previously indicated, (1) and (8) are double-barreled, giving both lower gasoline consumption and a lower net smog tax per gallon. Actions (2) and (6) may or may not diminish gasoline consumption, depending on whether or not the car with the better smog rating

(i.e. emitting less pollutants per gallon) also happens to give better gasoline mileage. Gasoline consumption would presumably not be decreased by action (9), and might even be increased if the exhaust device imposes substantial back pressure.

Actions (1) through (9) should typically reduce total pollutant emission by each of the individuals taking the actions. Thus the Smog Tax will moderate the total emission of pollutants in the Los Angeles basin. Part of this moderation can occur almost immediately, as a result of actions (1) through (7) and, possibly, some actions under (8). The remainder will occur as various anti-smog devices are developed and marketed. The Smog Tax generates an immediate and massive demand for effective and economical anti-smog devices, which should spur the rapid development of effective devices and which should also encourage continuous improvements in them. There is no need to establish legal standards of performance or cost for such devices.<sup>1</sup> Once the Smog Tax has been set, it can be left to the individual vehicle operator to decide whether a particular device is sufficiently effective in relation to its price to be worth buying.

The effects of the Smog Tax are illustrated in terms of three hypothetical individuals. Mr. Pinchpenny drives a small, well-tuned economy car 3000 miles per year in the Los Angeles basin, averaging 30 miles per gallon, with a smog rating entitling him to a rebate of 6 cents per gallon. Mr. Leadfoot, at the other extreme, drives 10,000 miles per year in the basin in a large luxury car averaging 8 miles per gallon, with a smog rating permitting no rebate. In between is Mr. Doakes, driving 5000 miles per year in the basin in an average car giving 12 miles per gallon, smog-rated for a rebate of 4 cents per gallon. The gross tax is assumed to be 10 cents per gallon.

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<sup>1</sup>With the possible exception of exhaust afterburners, which present special problems, mentioned later.

If the three individuals take no smog-reducing action, the net Smog Tax will cost Mr. Pinchpenny 4 cents per gallon on 100 gallons, or \$4 per year; Doakes will pay 6 cents per gallon on 417 gallons, or about \$25 per year; and Leadfoot will pay 30 cents per gallon on 1250 gallons, or \$125 per year. The net tax paid is approximately proportional to the total pollutant output per year. Thus, compared with Mr. Pinchpenny's modest annual pollutant output, Doakes emits about six times as much and Leadfoot thirty times as much. Leadfoot has the most to gain by reducing his smog output, and Doakes is next, which is as it should be. As mentioned previously, however, the extent to which an individual takes anti-smog action depends not only on the cost and inconvenience of the action, but on his particular circumstances and attitudes.

Let us follow our hypothetical basin drivers some distance into the future. Mr. Pinchpenny, whose net smog tax bill is initially only \$4 per year, takes no action either immediately or later on. Thus he continues to pay \$4 per year and continues to emit the same modest amount of pollutant as before.

Mr. Doakes' initial smog tax bill of \$25 per year spurs him to take several actions which will be numbered as on pages 3 and 4:

- (1) He gets tuneups more often than formerly, adding to his annual maintenance expenditures, but, in return, improving his car's smog rating and thus increasing his rebate and also reducing gasoline consumption per mile.
- (4) He cuts down somewhat on unnecessary trips within the District, thereby driving fewer miles per year and purchasing correspondingly less gasoline in the District.
- (5) He drives with a lighter foot on the throttle, which further reduces his gasoline consumption in the District.

- (8) Later on, when it becomes available, he invests in a new carburetor designed to minimize fuel wastage during acceleration and deceleration, bringing a further improvement in his smog rating and a further decline in gasoline consumption. In his case an exhaust afterburner does not appear to offer enough additional improvement in smog rating and corresponding saving in smog tax to justify the cost of installation and upkeep.

To summarize, Mr. Doakes takes actions (1), (4), and (5) soon after the imposition of the smog tax, which save him money not only because of his reduced net smog tax bill but because of his diminished gasoline consumption. These actions more than offset his increased expenditures for more frequent tuneups, and result soon in a substantial reduction in his pollutant output. Action (8), taken later, saves further on both smog tax and gasoline consumption.

Mr. Leadfoot faces an initial annual smog tax bill of \$125, but feels he cannot be bothered to change his driving habits, no matter how much money it would save him. He is, however, willing to take other actions if their cost is sufficiently low compared with the resulting savings. With a little prodding by his repairman he takes the following actions:

- (1) Like Mr. Doakes, he gets tuneups more often, which increase his annual maintenance expenditures but improve his smog rating so that he qualifies for some rebate. This also reduces his costly consumption of gasoline.
- (8) a. He invests in a new camshaft designed for economical town driving, thereby improving his smog rating further to qualify for a higher rebate, and decreasing gasoline consumption further also.
- b. Later on, when it becomes available, he invests in a new carburetor, as did Mr. Doakes, bringing a further improvement in

smog rating and a still higher rebate, and reducing gasoline consumption even more.

- (9) Moreover, after a while he invests in an exhaust afterburner, which improves his smog rating even more and increases his rebate enough so that the saving in smog tax seems worth the cost of installing and maintaining the afterburner. Fortunately this particular afterburner has a low back pressure, so that it does not significantly increase his gasoline consumption.

Actions (1) and (8) a., then taken soon after the imposition of the smog tax, offer savings to Leadfoot both because they reduce his net smog tax per gallon and they decrease the number of gallons of gasoline he consumes. At the same time they moderate his pollutant output substantially. The later actions (8) b. and (9) bring further savings and a further reduction in pollutant output.

The qualitative consequences of the actions of the three hypothetical individuals are summarized in Table 1. The plus, minus, and zero symbols indicate increases, decreases, and no change, respectively in the items in question.

We have avoided showing illustrative numerical consequences for the action of the individuals in question, in order to avoid the possibility of futile argument concerning the validity or plausibility of the numbers, which, after all, pertain only to hypothetical individuals. It may be instructive, however, for the reader to try his hand at making what he regards as plausible estimates of the numerical consequences of the various actions, and to attempt to determine their cumulative effects on such items as gasoline consumption, net smog tax bills, and pollutant outputs. It will not be surprising if he finds,

Table 1  
CONSEQUENCES OF INDIVIDUAL ACTIONS IN RESPONSE TO SMOG TAX

| Individual | Actions                             | Initial conditions (number) and effects of actions (+, -, 0) |               |                     |                        |   |   | Met Smog Tax bill per year | Cost of Action other than gasoline cost |               | Index of Pollutant Output Per Year |
|------------|-------------------------------------|--|---------------|---------------------|------------------------|---|---|----------------------------|---|---------------|------------------------------------|
|            |                                     | Miles driven in basin per year                               | Miles per gal | Gal cons'd per year | Smog Tax Rebate \$/gal | Gasoline cost per year, excluding Smog Tax, (@ 30¢/gal) | Gasoline cost per year, excluding Smog Tax, (@ 30¢/gal) |                            | Installation Cost                       | Annual Upkeep |                                    |
| Finchpeany | Initial condition (no action)       | 3000   | 30            | 100                 | 6                      | \$30  | \$30  | \$4                        | 0                                       | 0             | 4                                  |
| Conkes     | Initial condition (no action)       | 5000   | 12            | 417                 | 4                      | \$125   | \$125   | \$25                       | 0                                       | 0             | 25                                 |
|            | Early actions: (1) more tuneups     | 0  | +             | -                   | +                      | -   | -   | -                          | 0                                       | +             | -                                  |
|            | (4) driving less                    | -  | 0             | -                   | 0                      | -   | -   | -                          | 0                                       | 0             | -                                  |
|            | (5) lighter foot on throttle        | 0  | +             | -                   | 0                      | -   | -   | -                          | 0                                       | 0             | -                                  |
|            | Later actions: (8) new carburetor   | 0  | +             | -                   | +                      | -   | -   | -                          | +                                       | 0             | -                                  |
| Leadfoot   | Initial condition (no action)       | 10,000   | 8             | 1250                | 0                      | \$375   | \$375   | \$125                      | 0                                       | 0             | 125                                |
|            | Early actions: (1) more tuneups     | 0  | +             | -                   | +                      | -   | -   | -                          | 0                                       | +             | -                                  |
|            | (8a.) new camshaft                  | 0  | +             | -                   | +                      | -   | -   | -                          | +                                       | 0             | -                                  |
|            | Later actions: (8b.) new carburetor | 0  | +             | -                   | +                      | -   | -   | -                          | +                                       | 0             | -                                  |
|            | (9) Afterburner                     | 0  | 0             | 0                   | +                      | 0   | 0   | -                          | +                                       | +             | -                                  |

for example, that Doakes' pollutant output eventually drops to less than half its original level, and Leadfoot's to perhaps less than a fifth of its original high level. Such estimates are, of course, of dubious significance except to suggest that the Smog Tax may conceivably be quite effective.

The reader might also want to appraise the comparative equitability of the Smog Tax and Rebate formula as against one that equally penalizes (say by demanding the installation of a \$100 catalytic afterburner) the three unequally culpable drivers.

To summarize, the illustrative cases considered above suggest certain points which deserve emphasis:

1. Individuals differ widely in circumstances, attitudes, and pollutant emissions.
2. A great variety of smog-reducing actions are available now; progress on smog control need not be suspended awaiting the perfection of exhaust afterburners and other devices.
3. Some smog-reducing actions may be very profitable to the individuals in question, because of large savings in gasoline costs, aside from the savings in Smog Taxes.
4. It is very difficult to precisely predict individual actions in response to the Smog Tax, or the consequences of these actions.
5. Although the smog-reducing effects of the Smog Tax cannot be predicted with any confidence at this time, the conceivable and, one might say, likely effects, both immediately and later on, are sufficiently promising to warrant serious consideration of the Smog Tax.

The discussion of the effects of the Smog Tax has dealt so far with only two kinds of individual actions; measures to reduce gasoline consumption within the basin, and measures to decrease the net Smog Tax per gallon of gasoline

consumed. The Smog Tax may also induce another kind of action; namely, evasion, legal and otherwise. It may well turn out that the Smog Tax must be rather stiff (possibly stiffer than assumed in the examples above in which the maximum Smog Tax was 10 cents per gallon) in order to achieve the desired smog reduction goal. If that is the case, the incentives for evasion will be correspondingly greater, and the Smog Tax program may break down unless backed up with sufficiently effective administrative procedures to forestall this mass evasion. The administrative procedures outlined below are suggested with such objectives in mind. No claim is made, however, that all problems have been foreseen or that the procedures as they stand would suffice to meet all problems. It is left to experts to judge the adequacy of the procedures in question, or to work out better ones.

#### ADMINISTRATIVE PROCEDURES

The procedures suggested here imply that the program is administered locally; independent of state and federal agencies or programs. Local administration appears to be feasible, but it may possibly be preferable to combine the procedures of the local Smog Tax program with those of the state license bureau, state gasoline tax program, or a statewide smog control program. Such a combination may call for a modification of the procedures suggested here; the kind of modification called for is probably obvious in most cases.

#### Smog Rating

In order to qualify for a smog tax rebate on gasoline consumed by a given vehicle, a valid Smog Rating must have been in effect for that vehicle during the period in which the gasoline was consumed. As mentioned previously, the Smog Rating is based on an official test. The test might be conducted, for example, by putting the vehicle on a dynamometer test stand, running it through a standard pattern of acceleration, deceleration, and steady speed, and measuring the average pollutant content of the exhaust gas during the test period. Fuel consumed during the test period is also determined, either by direct measurement or by calculation based on measured combustion products in the exhaust. Pollutants can probably be determined either in terms of the directly measured amount of unburned hydrocarbons emitted, or in terms of a reliable indirect indicator of the hydrocarbon content of the exhaust. If and when research has established the relative smog-producing properties of various classes of hydrocarbons (e.g. saturated vs. unsaturated, large vs. small molecules, straight vs. branched-chain vs. cyclic molecules) and various

compounds of nitrogen, sulfur, phosphorus, lead, bromine, etc., a more sophisticated pollutant measure may be justified. It is assumed that suitable test equipment can be developed for routine operation by trained nonprofessional personnel. The smog test results are translated into a Smog Rating, which measures the quantity of pollutant produced per gallon consumed by the vehicle tested. It is suggested that an inspection fee (of, for example, \$2.00) be established which will cover some of the costs involved. The amount of the fee should be such that it discourages indiscriminately frequent inspections and yet does not discourage smog reducing actions by individuals because of the expense they would bear for an official appraisal of those actions.

The Smog Rating on a given vehicle remains in effect for a stated period of time following the smog test. It would be administratively convenient for this time period to be the same for all vehicles. Such a uniform period, of perhaps a year, would appear practicable on almost all counts except for one complicating factor, exhaust afterburners. Unless quite rigid and narrow legal standards are imposed, various types of afterburners will undoubtedly differ widely in requirements for periodic cartridge replacement or other servicing that maintains their effectiveness. Moreover, such devices are particularly susceptible to evasion techniques such as, for example, installing very cheap cartridges which last only long enough to get through the smog test and which become ineffective a few days or even hours later, or passing one afterburner around among several cars for smog test purposes. The problems presented by afterburners are not peculiar to the proposed Smog Tax program, but are common to all smog-control proposals involving voluntary or compulsory vehicle inspection and voluntary or compulsory installation of

afterburners. The problems posed by afterburners probably call for special treatment. No attempt will be made here to explore various conceivable approaches or to recommend a particular approach. Suffice it to say that the problems must be faced and solved in any smog-control program in which afterburners play a significant part.

Depending on how the afterburner problems are handled, the Smog Ratings of different vehicles may or may not remain in effect for the same period of time. In any event, each Smog Rating is given a definite expiration date based on some specified criterion. For a small fee a vehicle may be submitted for retesting before its current Smog Rating has expired. Thus the owner may qualify promptly for a better Smog Rating and higher tax rebate as a result of work done on his vehicle that reduces pollutant output. An individual who does not seek a rebate is not required to have his car smog tested at all, unless a compulsory test is called for in connection with the afterburner problem or for purposes other than the Smog Tax program.

#### Smog Tax Rebate Schedule

For rebate computation purposes it may be convenient to group Smog Ratings into categories. An example of such categories and their corresponding rebates is given in the illustrated rebate schedule in Table 2. The schedule is based on the following considerations: (a) the gross Smog Tax is set at 10 cents per gallon as in previous examples; (b) the average vehicle is assumed to emit unburned hydrocarbons amounting to 7 per cent of the fuel consumed;<sup>1</sup> (c) the average vehicle Smog Rating is assigned to an intermediate category somewhat below the middle, in terms of rebate due.

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<sup>1</sup> A figure given in APCO literature a few years ago.

The schedule imposes, in effect, a net Smog Tax amounting to something over 15 cents per pound of pollutant emitted.<sup>1</sup> Different assumptions would, of course, lead to a different schedule.

Table 2  
ILLUSTRATIVE SMOG TAX REBATE SCHEDULE

| Smog Rating Category | Percentage of Fuel Unburned | Rebate per Gallon | Net Smog Tax Per Gallon |
|----------------------|-----------------------------|-------------------|-------------------------|
| 0                    | below 1.0                   | 10¢               | 0¢                      |
| 1                    | 1.0 - 1.9                   | 9                 | 1                       |
| 2                    | 2.0 - 2.9                   | 8                 | 2                       |
| 3                    | 3.0 - 3.9                   | 7                 | 3                       |
| 4                    | 4.0 - 4.9                   | 6                 | 4                       |
| 5                    | 5.0 - 5.9                   | 5                 | 5                       |
| 6                    | 6.0 - 6.9                   | 4                 | 6                       |
| 7                    | 7.0 - 7.9                   | 3                 | 7                       |
| 8                    | 8.0 - 8.9                   | 2                 | 8                       |
| 9                    | 9.0 - 9.9                   | 1                 | 9                       |
| 10                   | 10.0 or more                | 0                 | 10                      |

#### Gasoline Purchase Receipts

With each purchase of gasoline within the Fresh Air District, the dealer is required to give the purchaser one or more copies of a serially-numbered receipt indicating the date, vehicle license number, and number of gallons purchased, keeping a duplicate copy for inspection by District authorities. The customer's receipts are subsequently submitted by him to District Headquarters when applying for a rebate. The dealer's copies can be checked from

<sup>1</sup> For example, an average vehicle, emitting 0.07 gallons (0.4 pounds) of unburned hydrocarbon per gallon of fuel consumed, would pay a net tax of 7 cents per gallon, which comes to  $7 \div 0.4$  or about 17 cents per pound of pollutant emitted.

time to time against his pump readings, on the one hand, and matched with customers' copies, on the other hand, to help deter or detect such practices as gasoline bootlegging or the writing up of fraudulent receipts.

#### Collection of Gross Smog Tax

The gross Smog Tax (10 cents per gallon in our examples) is collected from either retailer or distributor, whichever proves more convenient. If possible, the administrative burden on both dealers and District authorities is minimized by combining the gross Smog Tax with the state gasoline tax for collection purposes.

#### Rebate Procedure

A rebate can be obtained only on gasoline purchased for a vehicle with a Smog Rating in effect at the time of the gasoline purchase. The individual applies for a rebate by submitting his gasoline purchase receipts to District Headquarters. The rebate due is computed, based on the relevant Smog Rating or ratings on file there, and remitted to him by check. Annual rebates would probably suffice for private vehicles, but quarterly rebates might be justified for commercial vehicle operators.

#### Fresh Air District Boundaries

Insofar as possible, the boundaries of the Fresh Air District should be selected to minimize the number of people living, working, or traveling near or outside the District boundaries and who do considerable driving in the Los Angeles basin. Such people could profitably buy Smog-Tax-free gasoline outside the District, some of which would contribute to smog in the basin when consumed there.

Whatever boundaries are chosen, there will be some inequities, since (1) gasoline stations just inside the boundaries will presumably lose much of their business to stations just over the line, and (2) gasoline will cost less to people near the boundaries than to those further inside the District. Such inequities and loopholes could perhaps be practically eliminated by extending the District boundaries into the desert, or even making the program statewide. The proposed Smog Tax program is, however, envisioned primarily as a local solution to a local problem, not to be imposed any more than necessary upon individuals contributing little or no smog to the Los Angeles basin. No law was or ever will be completely free from inequities and loopholes, however, and the line must be drawn somewhere.

The approximate outlines of a suggested Fresh Air District are shown in the appended map. The District boundaries encompass not only the principal smog-ridden areas but also some thinly populated surrounding territory, which is relatively free of smog, incorporated in the District as a "buffer zone" to minimize the inequities and loopholes mentioned above. The prospect of sharing the net revenue from the Smog Tax should furnish some inducement to bring the outlying areas into the District; otherwise they would have little or no incentive to join the District. The shares of the net revenue might be proportional to the numbers of auto registrations in the sections of the cooperating counties that are included in the District.

#### Smog Tax Net Revenue

As mentioned earlier, the illustrative rebate schedule above implies a net smog tax of about 15 cents per pound of pollutant emitted. According to APCD estimates of a few years ago, about 1000 tons of pollutants are emitted daily from motor vehicle exhausts in the Los Angeles basin. If these estimates

still apply, the initial net revenue (i.e. gross smog tax less rebates, but not deducting administrative cost) would be about \$100 million per year, assuming negligible evasion. Allowing for possible errors or changes in estimates of pollutant emission, and allowing for the possibility that the actual rebate schedule may differ substantially from our illustrative schedule, we cannot rule out the possibility that the initial annual net revenue might be as low as \$50 million, or as high as \$150 million. The initial revenue estimates apply, of course, only to the period before individuals have taken actions to reduce their pollutant outputs appreciably. If the Smog Tax program is successful in eventually reducing total pollutant emission to a small fraction of its former level, the net smog tax revenue will eventually decline to about the correspondingly small fraction of its original level.

If the net revenue of the Smog Tax program is of the order of magnitude indicated above, it should be more than sufficient to finance the administration of the program, even allowing for the decline in revenue over time. The surplus revenue, shared among all communities within the District, could be used to support other smog-control activities, to finance activities not connected with smog control, or to retire bonded indebtedness.

#### Evasion and Fraud

In addition to legal evasion by purchasing gasoline over the border, it is easy to think of many ways of evading the smog tax or profiting from it by fraud. Individuals may fill the tanks of cars that have good smog ratings, obtaining receipts crediting the purchase to the car in question, and then transferring the gasoline to other, smoggier vehicles. In this way one could earn higher rebates than one is entitled to on the basis of the smog rating of

the vehicles actually using the gasoline. Collusion between individuals and gasoline dealers may similarly attribute gasoline purchases to cars with smog ratings better than those of the vehicles actually using the gasoline. Except for the case of commercial fleet operators, the gains from these and other related schemes would be small. Various cross checking procedures could probably be devised to make the risk of detection sufficiently great to deter most such schemes, especially if violators were subject to severe penalties.

Another class of schemes, previously mentioned, would be designed to give a car a better smog rating than it is entitled. For example, a relatively expensive exhaust afterburner might be transferred about among several cars, for the purpose of obtaining favorable smog ratings. But this may well be a problem solely with respect to afterburners, not only because they are relatively expensive and readily transferable from one vehicle to another, but also because the only incentive for installing one is to obtain a good smog rating. Other devices, such as anti-smog carburetors, for example, would appear much less likely to be shifted around in that fashion: not only are they probably cheaper and less readily transferable, but their installation and use not only improves the vehicle's smog rating, but also typically improves gasoline mileage, offering savings which may quickly pay for the cost of the device. The transferring of afterburners from car to car can perhaps be minimized by such measures as officially sealing the devices in place and/or identifying the devices by serial number. As mentioned earlier, the problems presented by afterburners are not peculiar to the Smog Tam program, but are common to almost all smog-control proposals.

### EXTENSION OF SMOG TAX PRINCIPLE

The proposal described above is designed to induce individual vehicle operators, private and commercial, to reduce their output of pollutants in the Los Angeles basin. Attention has been confined to gasoline-powered vehicles. Conceivably the Smog Tax principle may also be applied to other sources of air pollutants such as diesel-powered vehicles, power stations, and refineries.

If research should show that diesel-powered vehicles are, in general, insignificant smog producers, they could be excluded as a class from the Smog Tax program. If the diesel smog contribution is not negligible, they would presumably be treated in the same fashion as gasoline-powered vehicles, the differences being primarily in the details of the smog test, smog rating, and rebate schedule.

Industrial plants obviously present quite different problems. The principal problem would appear to be in devising practical procedures for measuring the total pollutant output of individual plants. If such procedures can be developed, each establishment could be taxed directly in proportion to its pollutant output. The tax rate might or might not be same as that applied to motor vehicles.<sup>1</sup> Conceivably the difficulties of developing practicable and reliable sampling procedures or other methods of measuring pollutant output may be so formidable as to rule out the application of the Smog Tax to industrial facilities. Such an application, however, appears at least worth serious consideration.

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<sup>1</sup>In the example above, the effective tax rate was about 15 cents per pound of pollutant emitted.

One air pollution factor which has not been mentioned above is the composition of the gasoline used by motor vehicles. If research should show substantial differences in the smog-producing properties of different gasolines, it might be desirable to take steps to discourage the production or use of the smoggier types of gasoline. One approach would be to establish mandatory legal standards of composition, imposed on producer, distributor and/or retailer. Another approach would be to impose a higher gross smog tax on the smoggier gasolines, rebates being proportional to those in the ordinary schedule. Either approach would appear feasible, provided that the relation between composition and smog properties is sufficiently clear cut. The composition of gasoline used might need to be determined and taken into account in the vehicle smog test.

### COMPARISON OF SMOG TAX VERSUS ALTERNATIVE PROPOSALS

The Smog Tax is intended as an alternative to other proposals with the same basic objective, that is, to induce individuals to reduce their pollutant outputs. These include alternative tax plans to induce voluntary actions by the individuals, and programs specifying mandatory anti-smog actions by individuals. It is not intended as a substitute for basically different attacks on the smog problem, such as developing a satisfactory public transportation system or breaking up the inversion layer.

All of the alternative tax plans and proposals for compulsory action that we have seen may be characterized as being almost entirely vehicle-oriented. Thus a tax proposal will typically tax a vehicle which lacks an approved smog-control device or which otherwise fails to meet inspection standards; similarly, the compulsory approach usually requires installation of an approved device or demands other measures to meet inspection standards. None of these proposals takes account of the fact that the amount of pollutant emitted depends not only on the characteristics of the vehicle, but on how much it is used. None provides an incentive to reduce smog by reducing vehicle usage, short of retiring the vehicle completely. The Smog Tax proposal provides incentives both to improve vehicle performance and to reduce vehicle usage, thereby encouraging more comprehensive and immediate action to reduce smog.

Most of the alternative proposals depend on the establishment of standards of performance for vehicles and/or smog-control devices. The standards of performance are yet to be established. In the meantime it is not surprising that progress on the commercial development of anti-smog devices has been slow. Businesses are understandably reluctant to sink much money in the

development of a device before the standards have been set. On the other hand, it is difficult to set practical standards until it is known what standards are commercially achievable. One way out of this vicious circle is to have a program, such as the proposed Smog Tax, which does not depend on the establishment of performance standards. Under the Smog Tax program individuals are left free to decide whether a particular device performs sufficiently well in relation to its cost to be worth buying; the objective in developing a device is thus not to meet performance standards but to achieve a satisfactory relation between performance and cost.

Another shortcoming of programs based on performance standards is that they provide no inducement for exceeding the standards. If standards are set on the performance of individual smog-control devices there will be no incentive to develop devices exceeding the established standards, and if standards are set on the kind, number, or overall effect of the devices installed on an individual vehicle, there will be no incentive to install additional or more effective devices. The Smog Tax program, on the other hand, would furnish an incentive for continual reduction in pollutant emission, to the extent that the action in question is sufficiently effective in relation to the cost.

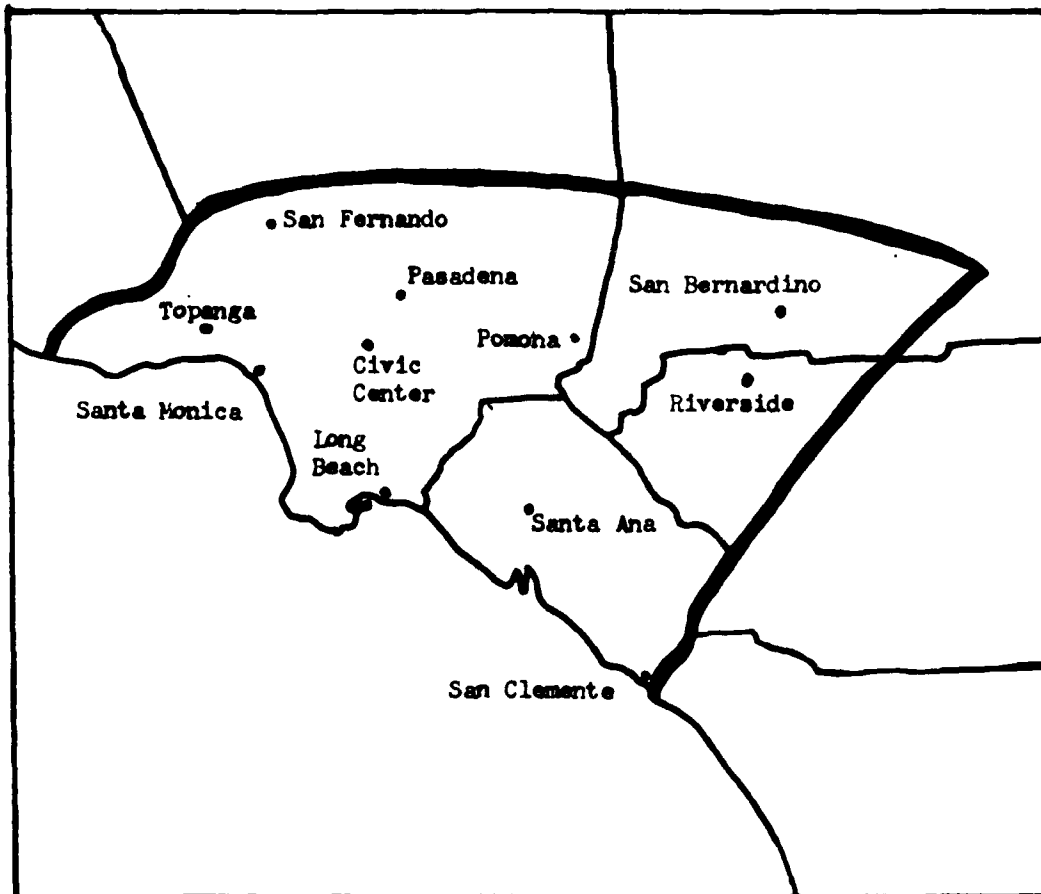
The comparison of the proposed Smog Tax program with alternative programs may be summarized in terms of the five objectives listed initially:

- (1) The Smog Tax plan would make a two-pronged attack on the smog generated by automobiles, not only encouraging all sorts of measures to improve automobile performance, but also encouraging a reduction in the use of automobiles, particularly the smoggier ones, in the Los Angeles basin. It would thereby accomplish more than other proposals toward reducing automobile-emitted pollutants to an acceptable level.

- (2) The Smog Tax plan would encourage the widest possible variety of immediate actions to reduce air pollution, rather than, as in most alternative proposals, relying primarily on yet-to-be-developed smog-control devices. Thus a substantial reduction in smog could be achieved soon, and the eventual smog reduction goal could be achieved at an earlier date than by alternative programs.
- (3) It is difficult to generalize concerning the relative administrative expense required by the Smog Tax program and alternative programs. All require a substantial inspection program. Enforcement would be less of a problem with the Smog Tax program, because inspection is voluntary. Most cars would probably be submitted for inspection, however, so the inspection activities themselves would most likely be comparable. The collection of the Gross Smog Tax and the computation and remittance of rebates could presumably be accomplished with a fairly modest effort. Cross checking and other measures to detect and deter evasion and fraud might require considerable effort. All things considered, the Smog Tax would probably require an administrative effort comparable to that of other plans, but it would have the advantage of bringing in more than enough revenue to pay for itself.
- (4) The Smog Tax involves only two types of compulsory measures: (a) all gasoline purchasers must pay the gross Smog Tax, and (b) the dealers must give proper receipts for all gasoline purchases. The individual is not required to have his car inspected, nor is he required to install any device, approved or otherwise, if he doesn't want to. The Smog Tax does, of course, make it advantageous for the

individual to take certain kinds of action, but whether or not he takes advantage of the actions is up to him. Few of the alternative proposals would involve as little interference with individual affairs.

- (5) The Smog Tax is designed to give the individual the widest possible latitude in choosing those anti-smog actions most appropriate to his personal circumstances. We believe it affords the fairest possible treatment of individuals in different circumstances, with different types of cars, different transportation needs, different driving habits, and different viewpoints. Each individual is penalized according to his output of pollutants. In a program aimed at the significant reduction of air pollutant output, this formula, we believe, is as fair and effective as any that can be derived. <



PROPOSED FRESH AIR DISTRICT